UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/599,343	09/29/2008	Henrik Thomsen	04305/0205482-US0	7168

7278 7590 07/06/2010

DARBY & DARBY P.C.
P.O. BOX 770
Church Street Station
New York, NY 10008-0770

EXAMINER	
LAUTURE, JOSEPH J	
ART UNIT	PAPER NUMBER
2819	

MAIL DATE	DELIVERY MODE
07/06/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/599,343	THOMSEN ET AL.	
	Examiner	Art Unit	
	JOSEPH LAUTURE	2819	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-5,8,10-15,21-23,25-27,30,32-37 and 42-45* is/are rejected.

7)☒ Claim(s) *2,6,7,9,16-20,24,28,29,31,33 and 38-41* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 March 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *092606,122206*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

The application has not been checked to the extent necessary to determine the presence of all possible typographical and grammatical errors. Applicant's cooperation is requested in correcting any errors of which he/she may become aware in the application.

The Information Disclosure Statements filed 09/26/2006 and 12/22/2006 have been considered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3-5, 10, 12-15, 21-23, 25-27, 32 and 34-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Melanson et al (US 7,116,721) in view of Yamaji (US 5,534,827).

Regarding claim 1, Melanson teaches in figures (2) and (5) a method of controlling a sigma delta modulator (See column 2, lines 21-23) with a loop which establishes a signal transfer function and a noise transfer function of the sigma delta modulator (See column 3, lines 3-6), wherein the sigma delta modulator receives an input signal (INPUT SIGNAL) and provides a modulated output signal in response to the input signal; wherein the noise transfer function inherently establishes a maximum

stable amplitude for the input signal since going beyond a maximum stable amplitude would cause overloading; wherein the loop comprises a loop filter (See column 3, lines 3-6); and wherein the method comprises the step of - controlling the sigma delta modulator to change the noise transfer function (See column 2, lines 21-23; column 3, lines 39-50; and, column 5, lines 41-46) inherently in response to a signal feature which is correlated with the input signal since the input signal is the signal being processed, wherein the signal feature that prompts the control/correction is provided from the loop filter since the noise transfer function is in the loop filter and since the control/correction and in this case the selection of suitable filter coefficients is in the loop filter.

Melanson et al do not teach that the maximum stable amplitude is to be maintained above the absolute value of the input signal, i.e. to have the largest allowable amplitude, and that the feature for which the noise transfer function is being controlled is obtained from the loop filter. Yamaji discloses a delta sigma modulator wherein he teaches that having a large signal amplitude reduces the influence of noise (See column 3, lines 32-34). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Melanson et al and of Yamaji to realize a delta sigma modulator having improved performance and reliability because a large signal amplitude reduces the influence of noise (See column 3, lines 32-34).

Regarding claim 23, Melanson teaches in figures (2) and (5) a sigma delta modulator (See column 2, lines 21-23) with a loop which establishes a signal transfer function and a noise transfer function of the sigma delta modulator (See column 3, lines

3-6), wherein the sigma delta modulator receives an input signal (INPUT SIGNAL) and provides a modulated output signal in response to the input signal; wherein the noise transfer function inherently establishes a maximum stable amplitude for the input signal since going beyond a maximum stable amplitude would cause overloading; wherein the loop comprises a loop filter (See column 3, lines 3-6); and wherein the method comprises the step of - controlling the sigma delta modulator to change the noise transfer function (See column 2, lines 21-23; column 3, lines 39-50; and, column 5, lines 41-46) inherently in response to a signal feature which is correlated with the input signal since the input signal is the signal being processed, wherein the signal feature that prompts the control/correction is provided from the loop filter since the noise transfer function is in the loop filter and since the control/correction and in this case the selection of suitable filter coefficients is in the loop filter.

Melanson et al do not teach that the maximum stable amplitude is to be maintained above the absolute value of the input signal, i.e. to have the largest allowable amplitude, and that the feature for which the noise transfer function is being controlled is obtained from the loop filter. Yamaji discloses a delta sigma modulator wherein he teaches that having a large signal amplitude reduces the influence of noise (See column 3, lines 32-34). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Melanson et al and of Yamaji to realize a delta sigma modulator having improved performance and reliability because a large signal amplitude reduces the influence of noise (See column 3, lines 32-34).

Regarding claims 3 and 25, the combination of Melanson et al and of Yamaji teaches a delta sigma modulator wherein the noise transfer function is changed while the sigma delta modulator operates in a stable state, i.e. without detection of overloading (See Melanson et al: column 2, lines 21-23; column 3, lines 39-50; and, column 5, lines 41-46).

Regarding claims 4 and 26, the combination of Melanson et al and of Yamaji teaches a delta sigma modulator including a loop filter having a cascade of integrators (See Melanson et al: column 8, lines 66-67).

Regarding claims 5 and 27, the combination of Melanson et al and of Yamaji teaches a delta sigma modulator wherein shaping of the noise transfer function is controlled by changing filter coefficients of a loop filter to move zeroes or poles in the transfer function provided by the loop filter (See column 4, lines 53-67).

Regarding claims 10 and 32, the combination of Melanson et al and of Yamaji teaches a delta sigma modulator wherein the input signal is provided via a pre-filter (205) (See figure 2 of Melanson et al) which is controlled/selected for anticipated or selected values of the input signal, the input signal having many associated features/characteristics.

Regarding claims 12 and 34, the combination of Melanson et al and of Yamaji teaches a delta sigma modulator wherein the signal feature that triggers controlling or correction of the noise transfer function is inherently a characteristic or attribute of the input signal, i.e. the input signal of the modulator (See figure 2 of Melanson et al).

Regarding claims 13 and 35, the combination of Melanson et al and of Yamaji teaches a delta sigma modulator wherein the signal feature that triggers controlling or correction of the noise transfer function is provided from the loop filter by processing that comprises low-pass (See column 1, lines 7-8).

Regarding claims 21 and 22, the combination of Melanson et al and of Yamaji teaches a delta sigma modulator wherein the delta sigma modulation is implemented with a computer program (See figure 5 of Melanson et al).

Claims 8 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Melanson et al (US 7,116,721) in view of Yamaji (US 5,534,827) and further in view of Chikhani et al (US 4,839,657).

Regarding these claims, the combination of Melanson et al and Yamaji teaches the essential features of the claimed invention as set forth above except for a specific quantizing level of the quantizer. However, as evidenced by Chikhani et al, it is obvious to select any suitable quantizing level for a quantizer because the level of quantizing is a matter of choice (See column 7, lines 31-33).

Claims 14, 15, 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Melanson et al (US 7,116,721) in view of Yamaji (US 5,534,827) and further in view of Armstrong (US 2003/0012393).

Regarding these claims, the combination of Melanson et al and of Yamaji teaches the essential features of the claimed invention as set forth above except for a peak detector to detect magnitude peak information for the purpose of controlling the noise transfer function and wherein the peak detector functions as a low-pass filter to

determine a value of the input signal. However, the use of peak detectors in delta-sigma modulators and the use of low-pass filters to detect magnitude fluctuations for preventing system overloading is well known, as evidenced by Armstrong (See paragraphs [0046] and [0035]).

Claims 42 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Melanson et al (US 7,116,721) in view of Yamaji (US 5,534,827) and further in view of Yang et al (US 2003/0227401).

Regarding claims 42 and 43, the combination of Melanson et al and of Yamaji teaches the essential features of the claimed invention as set forth above except for its incorporation in an analog-to-digital converter or a digital-to-analog converter. However, as evidenced by Yang et al, the usefulness of delta sigma modulators in analog-to-digital and digital-to-analog converters is well known (See paragraph [0004].

Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Melanson et al (US 7,116,721) in view of Yamaji (US 5,534,827) and further in view of Deruginsky et al (US 2003/0223592).

Regarding claim 44, the combination of Melanson et al and of Yamaji teaches the essential features of the claimed invention as set forth above except for the sigma delta modulator along with the pre-amplifier being incorporated in a microphone. However, as evidenced by Deruginsky et al, the use of pre-amplifiers and delta sigma modulators in microphone devices is well known (See paragraph [0025]; See title).

Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Melanson et al (US 7,116,721) in view of Yamaji (US 5,534,827) and further in view of

Regarding claim 45, the combination of Melanson et al and of Yamaji teaches the essential features of the claimed invention as set forth above except for the sigma delta modulator being incorporated in a class D amplifier. However, as evidenced by Masuda et al, the use of sigma delta modulators in class D amplifiers is well known (See column 2, lines 20-21).

Allowable Subject Matter

Claims 2, 6, 7, 9, 11, 16-20, 24, 28, 29, 31, 33 and 38-41 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

CONTACT INFORMATION

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Lauture, whose telephone number is (571) 272-1805. The examiner can normally be reached Monday to Friday between 9:30 am and 6:00 PM

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rexford Barnie can be reached at (571) 272-7492. The fax number for the organization to which this application is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see ***http://pair-direct.uspto.gov.*** Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free). For assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Joseph Lauture/
Examiner, Art Unit 2819
Date: Date: 06/29/2010